# The Studio

## Sydney Opera House

## Technical and Production Information
## The Studio

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# Technical and Production Information

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## Revisions

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Image by Daniel Boud

Image shows non-standard extra floor seating and raised stage

# Contents

# 1    Introduction

Designed primarily for contemporary music performances, The Studio (ST) is also suitable for film screenings, cabarets and burlesque acts, in addition to providing the perfect venue for spoken-word and corporate presentations.

Entrance to the auditorium is via the Western Broadwalk and Western Foyer (WF) to the mezzanine level. Stairs lead down from the mezzanine to floor level.

The venue has a flat, open floor area measuring approximately 15m x 15m. Two rows of fixed seating are set on all four sides of the mezzanine overlooking the floor space.

The colour scheme is predominantly red tones with a brush box timber floor, red wool upholstered seats and red carpet.

The WF is also shared by the Drama Theatre and Playhouse and offers unmatched views across the harbour to the Sydney Harbour Bridge.

It is intended that this document is read in conjunction with the SOH Event Guide.

## 1.1   List of Acronyms

| | |
|---|---|
| BOH | Back of House |
| CP | Central Passage |
| EWP | Elevated Work Platform |
| FOH | Front of House |
| GPO | General Power Outlet |
| GR | Green Room |
| SM | Stage Manager |
| ST | Studio |
| SMD | Stage Manager's Desk |
| SOH | Sydney Opera House |
| UDL | Uniformly Distributed Load |
| WF | Western Foyer |

## 2    Risk Management

In NSW, if you conduct a business or undertaking, you are legally obliged to manage certain risks. In particular, you must:

- Identify and eliminate risks to health and safety, or, if that is not practicable, then minimise those risks so far as is reasonably practicable; and

- Ensure the health and safety of your own workers, AS WELL AS ensure that other workers' or persons' safety is not put at risk by work carried out as part of your business or undertaking.

Work health and safety obligations in NSW are non-transferable and concurrent. This means that:

- Each business or person with safety obligations must comply with their WHS requirements; and

- If more than one business or person has a duty under the law, then they must comply to the extent that they can influence or control the safety matter.

Please refer to the SOH Event Guide.

### 2.1   Smoke Management System

The venue smoke management system consists of four smoke curtains located around the perimeter of the auditorium, providing protection from smoke rising to the mezzanine level.

In the event of the fire alarm system being triggered, the curtains will automatically lower from the ceiling, stopping just above the handrail level of the mezzanine. This is designed to contain any smoke and allow patrons to leave the venue without undue delay.

At the same time the emergency panic lighting will automatically switch on, the smoke exhaust fans located above the stage will start and make-up air (sourced from CP) will be delivered via the grill located at the north-eastern wall on mezzanine level.

Return air exits via grills located on the eastern floor level staircase, and must not be blocked.

**Special conditions associated with the Smoke Management system:**

- No technical equipment or scenic elements should be placed in front of the air supply duct on mezzanine level

- To ensure that make-up air can replace the air that is extracted from the stage area, there must always be at least 10m³ of open space on either east or western sides, or accumulative across both

- Any bump-in / out activities that may impede the smoke curtains temporarily must be cleared with SOH Fire & Safety prior to works commencing

- No cables should be installed that will interfere with the travel path of the smoke curtains. Any cables that need to be installed between the catwalk level or floor area and the mezzanine level (including the control booth) must use the special conduit paths installed at each corner of the catwalk or the special path from the catwalk into the top of the control booth

# 3    Venue Access

The ST floor is located one level beneath Central Passage (CP). SOH staff will assist you to unload equipment and transport it to the venue.

Two goods lifts (12 and 22) are available to carry equipment from the main SOH Loading Dock or CP to the venue. These lifts are shared with the Concert Hall.

Size and weight limits apply:

| Goods Lift Dimensions | | Lift 12 | Lift 22 |
|---|---|---|---|
| Internal Car Dimensions | Height | 2.40m | 2.39m |
| | Width | 1.65m | 1.95m |
| | Depth | 3.36m | 3.36m |
| Clear Door Opening | Height | 2.20m | 2.20m |
| | Width | 1.60m | 1.80m |
| Load Capacity | Max Capacity | 1,800kg | 1,800kg |
| | Point Load | 1,080kg | 1,080kg |
| Door Access into Venue from Lift | Height | 2.00m | 2.00m |
| | Width (seating bank retracted) | 1.87m | 1.87m |
| | Width (seating bank extended) | 1.20m | 1.20m |
| Other | Speed | 1.0m/s | 1.0m/s |
| | Doors | 3 Panel side opening | 3 Panel side opening |

## 4    Venue Dimensions

| Dimension | Distance | Details |
|---|---|---|
| Floor Area | 17.8m x 17.1m | Between floor level columns |
| Area at Mezzanine Level | 15.0m x 15.0m | 2.0m from floor level |
| Ceiling Height | 7.5m | From floor level to base of ceiling beams |
| Roof Truss Height | 7.0m | From floor level |
| Self-climbing Hoist Height | 6.8m | From floor level |
| Mezzanine Level | 2.0m | From floor level |
| Catwalk Level | 6.0m | From floor level |

Dimensions are approximate and critical measurements should be confirmed on site.

### 4.1    Floor Description

| | |
|---|---|
| Surface* | Brushbox timber, coated in Bona Traffic |
| Floor Rake | 0 Degrees (flat) |
| Max Loading | 7.5kPa (750kg/m²) – distributed |
| | 4.5kN (450kg) - concentrated |

*Drilling or screwing into the floor surface is not permitted

### 4.2    Venue Plans

Venue plans are available at sydneyoperahouse.com

Scale plans can be requested through SOH Event Operations as PDF's or as Vectorworks files. Email techspec@sydneyoperahouse.com or through your SOH Production Manager.

Uncontrolled copies can be found in the appendices of this document.

## 4.3  Venue Seating

The venue offers multiple seating configurations which determines audience capacity.

The usual fixed seating capacity is 280, with 156 seats on four sides of the mezzanine and 130 seats on the retractable seating bank.

Different seating layouts such as standing-room-only or cabaret configurations can add flexibility to the overall capacity.

The most commonly used theatrical seating configuration is shown below, with the retractable seating bank extended in its standard position:
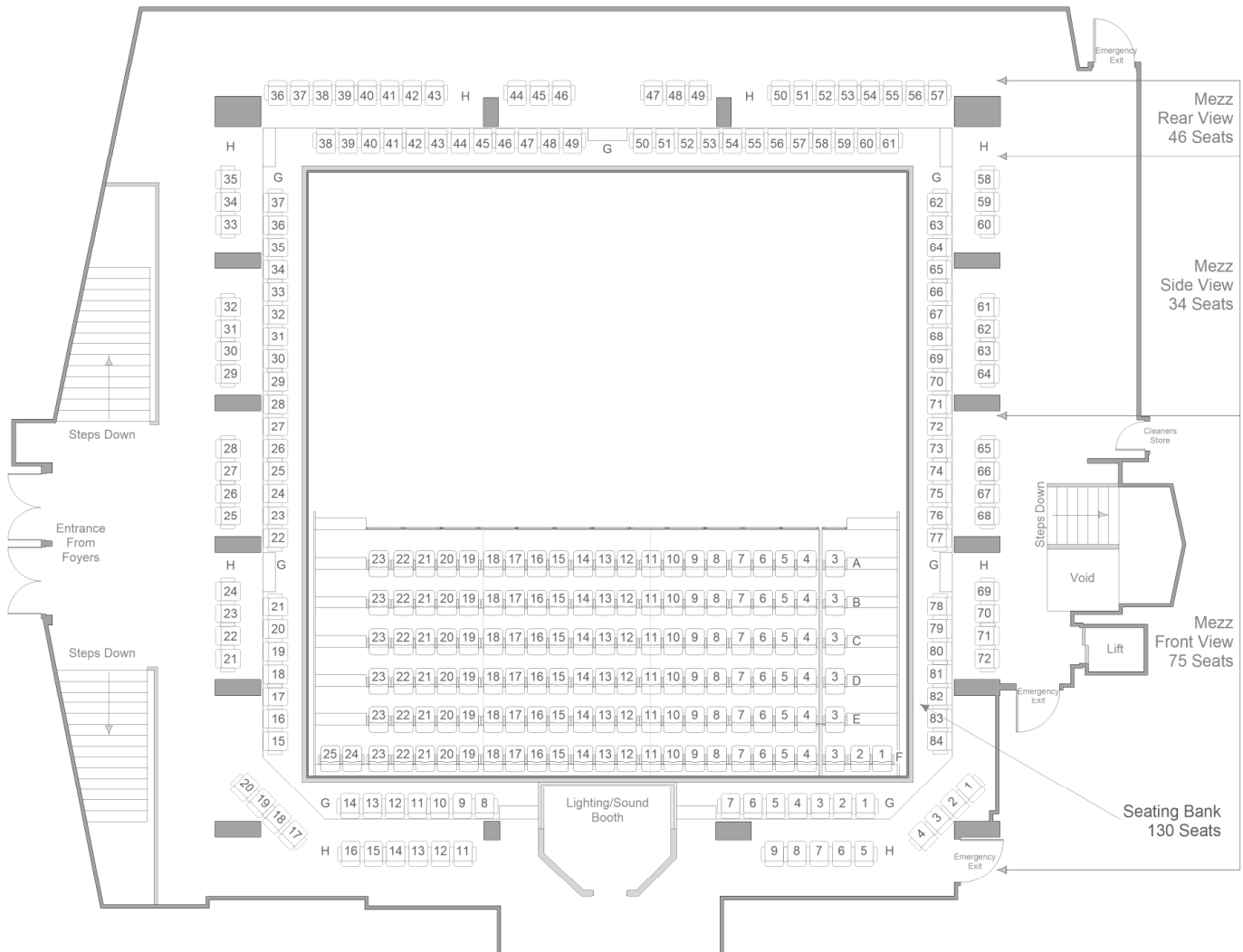
# 5    Staging

## 5.1    Static Grid

The static grid is at a height of 7.0m from floor level, and is capable of 3,000kg point loads per bay.

There are four north / south load rails, joined by an east / west load rail at the southern end.

A separate static hanging rail is installed at the northern end which can be used for curtains or screens.

### 5.1.1    Static Grid Plan



Track Masking Rail

Hanging Rail

Tri-Truss

Load Rails

Self-Climbing Hoist

N
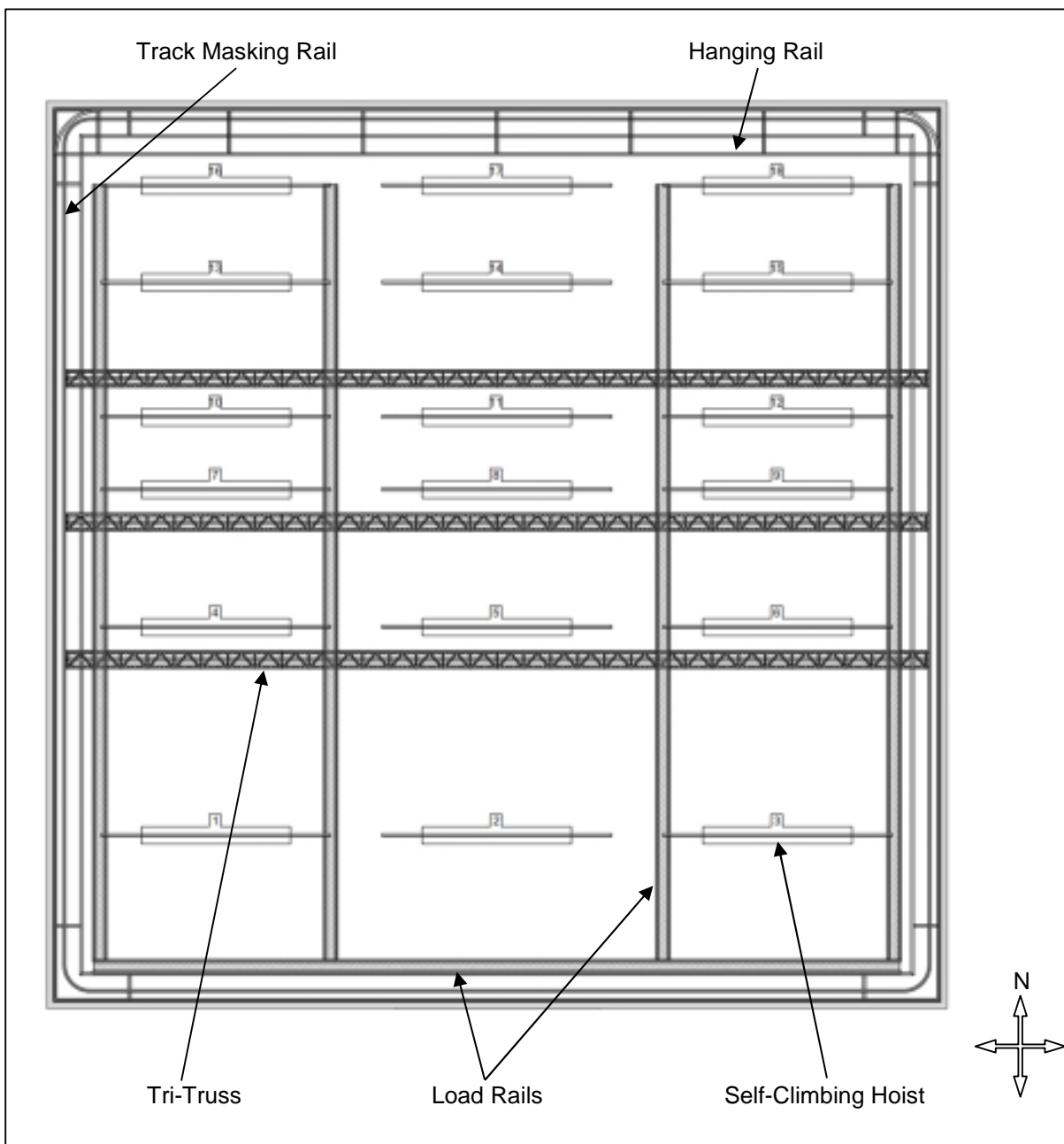
## 5.2 Stage Machinery

The venue has a range of stage machinery that is controlled by the Beckhoff Automation system by Simple Motion, and may only be operated by SOH staff.

### 5.2.1 Self-Climbing Hoists

The venue is equipped with 18 Strand self-climbing hoists, normally reserved for lighting positions but are also adaptable for suspending scenic elements.

| Self-Climbing Hoist Specifications | |
|---|---|
| Grid Configuration | Six bays of three (18 total) |
| 10A Dimmed Lighting Circuit | 4 per hoist |
| Speaker Outlet | 1 per hoist |
| DMX Outlet | 1 per hoist |
| DMX-controlled 10A GPO | 1 per hoist |
| Max loading | 140kg UDL per hoist |

### 5.2.2 Chain Hoists

The venue is equipped with 12 Stagemaker chain hoists. They are installed from the north / south load rails to suspend three 15m long tri-trusses running east / west (generally used to hang larger lighting rigs) and may be used for a variety of purposes.

| Chain Hoist Specifications | |
|---|---|
| Grid Configuration | Three rows of four |
| Max Loading | 500kg per hoist |

## 5.3 Track Masking

Black wool masking drapes surround the main floor area, suspended from a track near the upper gallery, and can be width-adjusted to suit. The masking may be pulled up onto gallery level in the event that it is not required.

A small black curtain is also installed at the northern end underneath the mezzanine to mask the alcove leading to the SMD and dressing rooms. This curtain can also be drawn aside out of view.

Venue fire suppression requirements do not permit all four sides of the track masking to be in position at the same time.

## 5.4 Retractable Seating Bank

The retractable seating bank on floor level houses 130 fixed seats. Its standard position is extended and can be retracted for an additional cost. See *Venue Seating* for additional information.

## 5.5  Standard Staging Equipment

The following equipment is included within the venue hire costs:

| Element | Equipment | Allocation | Details |
|---|---|---|---|
| General Furniture | Card Table | 3 | 830 x 830mm Square Top |
| | Trestle Table | 2 | 1800 x 750 Top |
| | Vinyl Chair | 10 | |
| | Black Screen | 4 | |
| Wardrobe | Wardrobe Rack | 2 | |
| | Desk Unit | 2 | Portable with mirror/screen |

## 5.6  Elevated Work Platform (EWP)

The venue EWP allocation is as below. All operators must be licenced.

| Equipment | Allocation |
|---|---|
| Genie GR20 | 1 |

## 5.7  Additional Staging Equipment

The following sections of equipment can be utilised by your production at an additional cost, subject to the requirements of the other venues:

### 5.7.1  Masking

The following cloths are allocated to the venue at additional cost:

| Element | Equipment | Allocation | Details |
|---|---|---|---|
| Masking | Border | 2 | Black, 15000 x 400 |
| | Tabs | 4 | Black, 4300 x 6000 |
| | Tabs | 3 | Black, 4300 x 6200 |
| Additional masking may be allocated upon request | | | |

### 5.7.2  Weathertex Flooring

Composite timber sheets of black 9mm Weathertex are available to fit the venue.

Use of the floor covering incurs additional time and labour costs.

### 5.7.3  Additional Equipment

The following equipment can be can be utilised by your production at an additional cost:

| Element | Equipment | Details |
|---|---|---|
| Rostrum | Megadeck 1.2 x 2.4m | Carpeted |
| | Megadeck 1.0 x 2.0m | |
| | Megadeck 1.0 x 1.0m | |
| | Megadeck Legs | 200 / 400 / 600 / 800mm |
| Floor Covering | Black Carpet | |
| | Vinyl | Black or White |
| | Sprung Dance Floor | |
| General Furniture | Card Table | 830 x 830mm Square Top |
| | Trestle Table | 1800 x 750 Top, Various Colours |
| | Cabaret Table | 600mm or 900mm Round Top |
| | Vinyl Chair | Black, Padded |
| Orchestral Furniture | Padded Orchestral Chairs | Height Adjustable |
| | Music Stands | |
| | Conductors Stand | |
| | Base Spike Board | |
| | Cello Riser | |
| Cloths | Sharkstooth Gauze | Various |
| | Filled Cloth | Various |
| | Push-up Drapes on Poles | Black, Various sizes |
| | 2m Book Flat Masking | Black or Grey, Padded |
| | 1.3m Book Flat Masking | Black, Padded |
| Rigging | 1T Chain Block | 7m chain |
| | 1/2T Chain Block | |
| | Tail Pipe | 20-25mm, various lengths |
| | Mini Quad Truss | 100mm, various lengths |
| | Tri Truss | Various lengths |
| | Box Truss | Various lengths |

# 6 Lighting

## 6.1 Standard Lighting Equipment

The following equipment is included within the venue hire costs:

### 6.1.1 Control

Performance lighting is controlled by an ETC Gio console in the control booth with an ETC Remote Processor Unit 3 tracking back-up system. Both systems have 24k channels and use an ELC DMX over Ethernet system for DMX distribution.

An ETC Nomad Puck interface is available for use with designer's monitors at the production desk. Various remote control units are available for rigging and focussing on floor level.

### 6.1.2 Data

The building has an ELC DMX over Ethernet system. It utilises sACN to distribute an almost infinite number of DMX universes. DMX nodes appear in the venue Control Room, Dimmer Room, the floor area and on the catwalk. Some points have permanently installed Ethernet to DMX nodes and extra nodes can be installed on request.

Alternate protocols such as ArtNet are not permitted to run on the House network.

External network devices must be approved by SOH prior to installation onto the network.

### 6.1.3 Power

All general and dimmed electrical power supplies are 240v AC at 50Hz.

Additional 3-phase supplies (415V AC) are available with Wilco pattern 5-pin connectors. Two are located on the catwalk and two on floor level.

### 6.1.4 Dimmers

Dimmer outlet distributions (2.4kW State Automation APC):

| Position | Allocation |
| --- | --- |
| Self-Climbing Hoist | 72 |
| Catwalk | 50 |
| Traps on Floor Level | 24 |

### 6.1.5 House Lights

The high-level house light system consists of 32 IncanAIR200 RGBWA Multipars which can be independently controlled to provide either audience house lighting or down light for the performance area.

The house lights can be controlled by the lighting desk or a manual fader system on a highest-takes-precedence basis.

### 6.1.6 Standard Lighting Rig

The standard lighting rig is allocated to the venue and can be utilised by your production.

If you require removal or relocation of any of the standard fixtures, there are costs associated with re-instatement.

| Lamp Type | Allocation |
|---|---|
| ETC Lustr 2 19 Degree | 7 |
| ETC Lustr 2 26 Degree | 12 |
| Selecon 1.2K Fresnel | 8 |
| Mac 250 Wash | 14 |
| Mac 250 Entour | 11 |
| Mac 700 Profile | 4 |
| Coloursource Par | 12 |
| Unique Hazer | 1 |
| Further lamp stock is available upon request, for an additional cost | |

### 6.1.7    Standard Lighting Rig Plan

A standard Lighting Rig Plan is available at sydneyoperahouse.com.

An uncontrolled copy can also be found in the appendices of this document.

## 6.2   Additional Lighting Equipment

The following equipment can be utilised by your production at an additional cost:

### 6.2.1    Music Stand Lights

24V LED sconce lights are available to fit music stands at an additional cost.

# 7  Sound & Audio Visual

## 7.1  Standard Sound Equipment

The following equipment is included within the venue hire costs:

### 7.1.1  Loudspeaker System

The venue has a permanently installed D&B Audiotechnik loudspeaker system:

| Component | Equipment | Allocation | Details |
|---|---|---|---|
| Main PA | L / R D&B Audiotechnik T10 Line Array | 2 | Hung from grid - one T-Sub & eight T-Line array elements per side |
| | D&B Audiotechnik T10 | 16 | Permanently hung providing mezzanine coverage |
| | D&B Audiotechnik V-Sub | 2 | Positioned on floor level |
| | D&B Audiotechnik E-8 | 2 | For fill as required |
| Front Fill | D&B Audiotechnik E6 | 4 | |
| Amplifiers | D&B Audiotechnik D12 | 4 | |
| | D&B Audiotechnik D6 | 4 | |
| | D&B Audiotechnik 10D's | 2 | |
| | D&B Audiotechnik 30D's | 3 | |
| Control | D&B R1 | | |

### 7.1.2  Operating Position

The standard operating and mixing position is from the open control booth, situated centrally on the southern mezzanine.

The control booth also houses lighting control.

### 7.1.3  Mixing Console

An SSL L350+ system is permanently installed comprising of

- Permanently installed I/O
    - 16 Line I/O
    - 16 AES I/O
- Mobile I/O Rack
    - 48 microphone preamplifiers
    - 24 Line outputs
    - 12 AES I/O

## 7.2 Additional A/V Equipment

The following equipment can be utilised by your production at an additional cost:

### 7.2.1 Audio

| Equipment | Model |
| --- | --- |
| Mixing Consoles/Remote Surfaces | SSL L650 Console |
| | SSL L350+ Console |
| | SSL Remote Tile with a touchscreen running SOLSA software |
| | Yamaha QL1 Console |
| Stage Monitors | D&B Audiotechnik M4 |
| | D&B Audiotechnik Y-SUB |
| | D&B Audiotechnik V series line array. |
| | D&B Audiotechnik V-Sub |
| | D&B Audiotechnik V10P |
| | D&B Audiotechnik Y10P |
| | D&B Audiotechnik Y7P |
| | D&B Audiotechnik E8 |
| Radio Microphones – Belt-packs (Shure Axient Wireless System) | AXT 100 Belt Packs: |
| | DPA 4066 |
| | DPA D:Fine |
| | DPA D:Fine 66 |
| | DPA 4061 |
| | DPA 4080 |
| | DPA 6066 |
| Radio Microphones – Handheld (Shure Axient Wireless System) | AXT 200 Handhelds: |
| | Shure KSM9 |
| | Shure Beta 58 |
| | Shure SM58 |
| Shure In-Ear Monitors | Stereo PT10T dual wireless transmitters |
| | P10R wireless body-pack receivers |
| | SE425 earpieces |
| Wired Microphones | SOH have a wide range of microphones from brands such as Sennheiser, Shure, AKG, DPA, Beyer and Neumann and offers a variety of packages to suit |
| Additional Playback | MacBook Pro running QLab |

### 7.2.2    Video Replay

The Sound & AV department has a range of playback options and switchers. SOH vision equipment is shared between all venues and its use in the ST is subject to availability and will incur additional charges.

| Equipment | Model |
|-----------|-------|
| Switchers | Barco Image Pro<br>Blackmagic Design ATEM 2 M/E Production Studio 4K |
| Vision Playback | MacBook Pro<br>Sound Devices Pix 270i |

### 7.2.3    Projection and Video Monitors

There are a number of options available for projector placement within the venue. Please note that in order to facilitate projection, the projector and screen must be rigged.

The general arrangement is for a projector to be rigged on motorised truss above the control booth.

| Element | Equipment |
|---------|-----------|
| Projectors | Barco HDX 14k |
| Screens | Stumpfl 7.3m x 4.1m (24ft x 13.5ft) 16:9 ratio Fastfold<br>Stumpfl 6.1m x 3.4m (20ft x 11.3ft) 16:9 ratio Fastfold<br>Stumpfl 4.8m x 2.7m (16ft x 9ft) 16:9 ratio Fastfold<br>Stumpfl 3.6m x 2.1m (12ft x 7ft) 16:9 ratio Fastfold |
| Video Monitors | LCD 75"<br>LCD 55"<br>OLED 17" |

# 8    Communications

## 8.1    Stage Manager's Desk

A Stagetec Stage Manager's Desk (SMD) is located in the corridor between the two dressing rooms. The desk is fully programmable, includes four broadcast-quality show relay screens, a telephone, two integrated Riedel Artist communications panels and dynamically assignable tactile LED buttons.

The SMD controls audio and video relay to both FOH and BOH spaces, and can be used to broadcast live or pre-recorded announcements to backstage or foyer spaces.

There is an automatic message stacking facility to prevent conflict with other venues when announcements are simultaneously sent from other venues to common areas of the building, such as the Green Room (GR). Features include dynamic allocation of paging, program audio relay, cue lights, and foyer bells.

FOH functions are generally managed by the Theatre Manager from a touch screen in the foyer, however these functions are also accessible at the SMD.

## 8.2    Show Relay

A colour image of the venue floor area is distributed to the SMD, lighting control, sound control, GR, some dressing rooms, and venue foyers. The SM has pan, tilt, and zoom control of the longview camera. A low-light camera is also permanently installed and sends vision to the SMD.

Longview and low-light feeds can be sent to most areas of the building by arrangement and can be sent to the Recording Studio for archival recordings (Refer to SOH Event Guide for further details on archivals).

## 8.3    Headset Communications

A Riedel Artist wired intercom system operates across all venues. Permanent talkback stations are available in lighting and sound control locations, and wired headset tie lines are installed at all regular operating positions.

A Riedel Bolero wireless beltpack system is fully integrated with the Riedel Artist wired intercom system, and is included within venue hire costs as per the below table:

| Equipment | Allocation | Details |
|---|---|---|
| Wireless Beltpack Comms | 8 | Riedel Bolero BBP |
| Additional units may be provided upon request at a per unit charge | | |

# 9    Production Desks

SOH are able to provide production desk equipment in the ST as part of the venue rental, with costs for labour to install or remove.

Standard set-up for this venue:

| Equipment | Details |
|---|---|
| Production Desk | Set-up on floor or mezzanine level |
| Comms Panel | Riedel DCP1016 |
| DELEC Panel | Links to SM system, enables BOH calls & cue lights |
| Phone | Avaya IP phone |
| Additional units may be provided upon request, pending availability.<br>In the event of SOH stock exhaustion, costs may be applied. | |

# 10 Backstage Facilities

## 10.1 Dressing Rooms

Two dressing rooms with adjoining toilets and showers are located on the north side of the venue on floor level.

Each dressing room can accommodate up to six performers and includes tea and coffee making facilities and a small refrigerator.

A filtered water tap is located in the laundry.

## 10.2 Rehearsal Rooms

There is no rehearsal space dedicated to the venue. Rehearsal space is very limited across SOH.

## 10.3 Wardrobe, Laundry and Kitchen Facilities

A laundry room adjoins one of the venue dressing rooms. Ironing equipment and a steamer are available on request.

Venue laundry allocation:

| Equipment | Allocation |
|---|---|
| Electric clothes dryer | 1 |
| Front loading clothes washing machine | 1 |

## 10.4 Storage Space

Storage space on SOH site is very limited. There may be some space available for storing equipment in CP, upon prior request.

## 11    Protection of Building Surfaces

Appropriate measures must be taken to ensure the protection of all SOH building fabrics and surfaces, including wood, granite, glass, ceramics, concrete and bronze.

Prior consultation and approval is required for any plans to attach to or penetrate building surfaces.

You must provide suitable rubber pads, plywood sheets or plastic to protect all building surfaces including but not limited to floors, walls, chairs and ceilings.
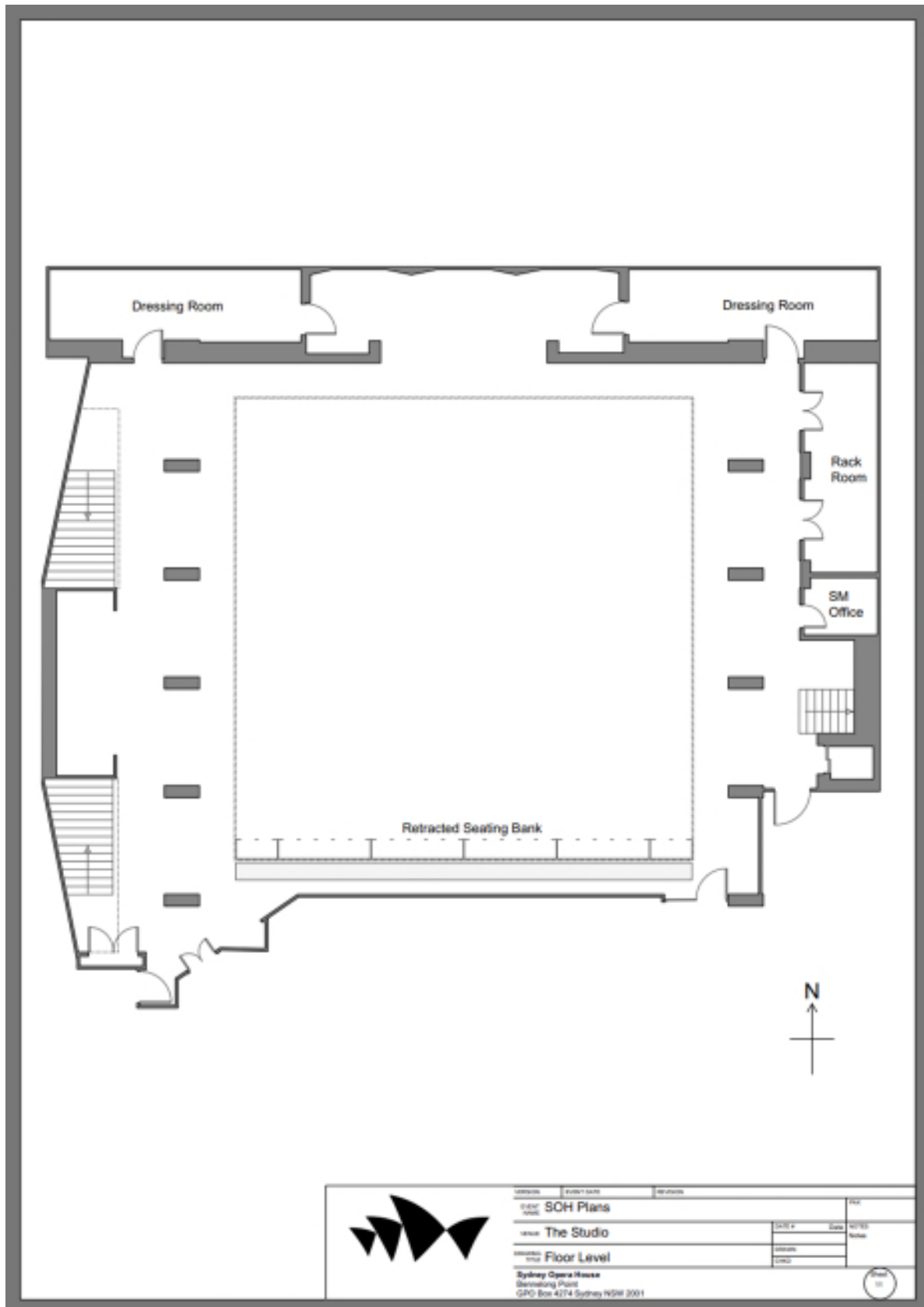
The use of paints or chemicals on SOH building surfaces or fixtures is prohibited. Similarly, any use of water, soaps or cleaning fluids of any kind must be pre-approved by Building Operations.

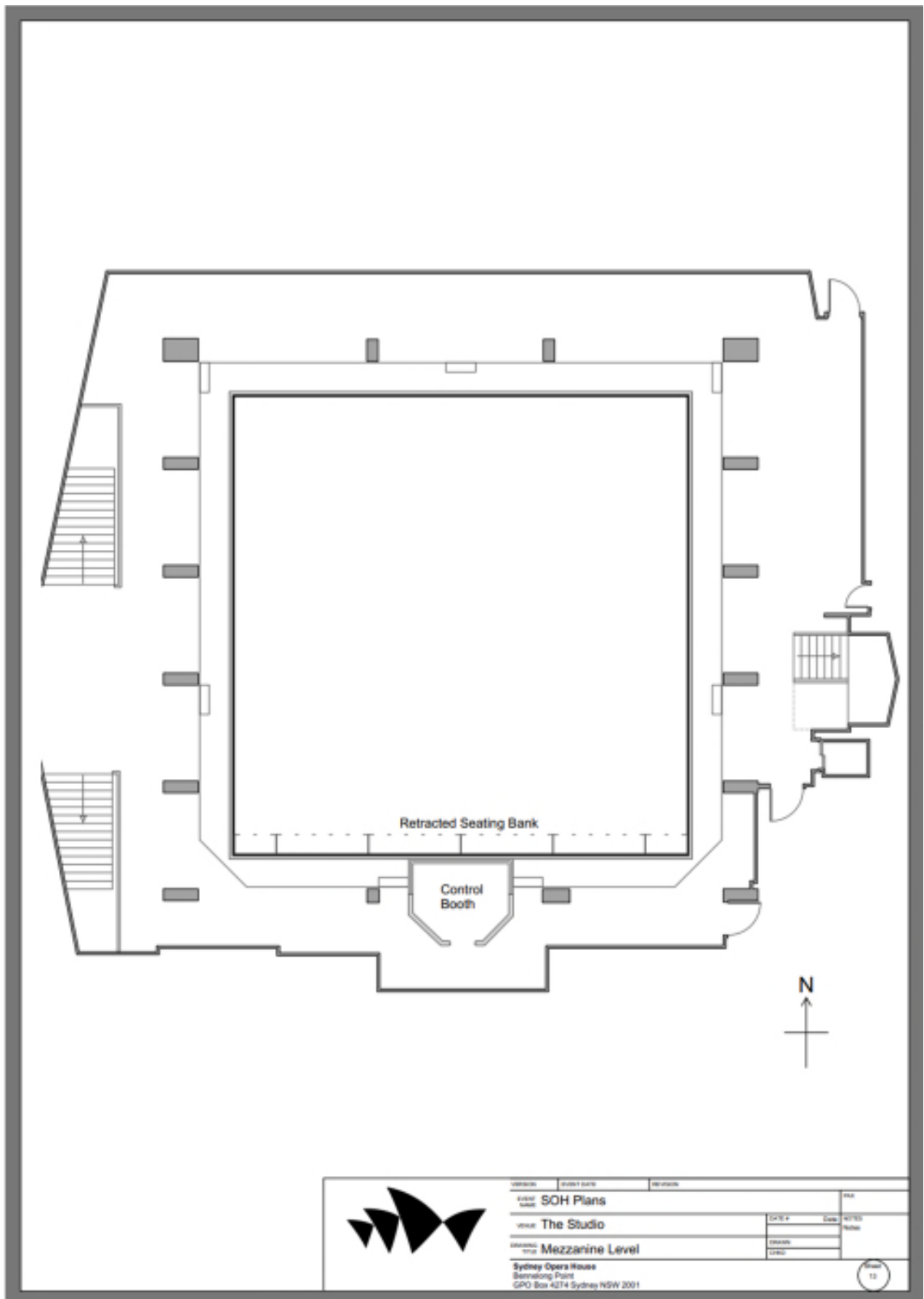Drilling or screwing into the ST floor is not permitted.

# 12 Appendices

## 12.1 Venue Plan – Floor Level

## 12.2 Venue Plan – Mezzanine Level



Retracted Seating Bank

Control Booth

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SOH Plans

The Studio

Mezzanine Level

Sydney Opera House
Bennelong Point
GPO Box 4274 Sydney NSW 2001

## 12.3 Venue Plan – Section



SOH Plans

VENUE The Studio

DRAWING TITLE Section Plan - East / West

Sydney Opera House
Bennelong Point
GPO Box 4274 Sydney NSW 2001